EPA
Region I, New England

Superfund Program **June 2006**

Proposed Plan

West Kingston Town Dump / University of Rhode Island Disposal Area
Superfund Site
South Kingstown, RI

The Cleanup Proposal At A Glance...

After careful study of the impacts of soil and groundwater contamination remaining at the West Kingston/ University of Rhode Island Disposal Area Superfund Site, the Rhode Island Department of Environmental management (RIDEM) and the United States Environmental Protection Agency (EPA) proposes the following cleanup plan:

- Excavation of clean soils within the Former Drum Storage Area to the depth where contaminated soil is encountered, and treatment of contaminated soils via mixing of a chemical oxidant with impacted soils in the excavation, and then backfilling the hole with clean soil.
- Treatment of dissolved constituents in the bedrock groundwater plume in the Former Drum Storage Area (top of hill) via injection of chemical oxidants.
- Natural attenuation of dissolved constituents in downgradient (below the hill) groundwater.
- Institutional controls in the form of deed restrictions to restrict groundwater and land use.
- Implementation of an environmental monitoring program. Environmental monitoring would involve routine periodic sampling and analysis of groundwater and surface water to confirm the effectiveness of the proposed remedy in reducing concentrations of Site-related contaminants.

Two former landfills at the Site, the former Town Dump and URI Disposal Area have been capped pursuant to state law with RIDEM oversight. Although separate from this proposed remedy, the protectiveness of the proposed plan assumes the continued maintenance of these landfill closures. The RCRA cover system will be inspected and maintained as part of the state regulated landfill closure, and includes institutional controls that will be used to protect the landfill caps from being disturbed.

This proposed cleanup plan has been developed by RIDEM in cooperation with the EPA, and EPA has approved this proposed plan. A closer look at the proposed cleanup plan is discussed in the following sections.

To learn more about the proposed cleanup plan a public information meeting will be held on Wednesday June 28, 2006 at 7 p.m. A Public Hearing for the Proposed Cleanup Plan will be held Wednesday, July 26, 2006 at 7 p.m. Both events will be held at the:

Information Session on Proposed Plan
7:00 pm
Wednesday, June 28, 2006
The University of Rhode Island 210 Flagg Road
Conference Room
Kingston, RI 02881

Formal Public Hearing
Same location as above
Wednesday July 26, 2006
7:00 pm

The University of Rhode Island
210 Flagg Road
Conference Room
Kingston, RI 02881

To provide formal comment, you may offer oral comments during the public hearing or send written comments by email or letter postmarked no later than Monday July 31, 2006 to:

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RIDEM
Office of Waste Management
235 Promenade St.
Providence, RI 02908
(401) 222-2797 ext. 7148
E-mail: gary.jablonski@dem.ri.gov

For more information about the proposed plan, public meetings, or should you have specific needs or questions about the public meeting facility and it's accessibility, please contact RIDEM Project Manager, Gary Jablonski at 401-222-2797 Ext. 7148.

In accordance with section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the law that established the Superfund program, this document summarizes RIDEM's cleanup proposal. For detailed information on the options evaluated at the site, see the Feasibility Study available for review at the information repositories at the South Kingstown Public Library in Peace Dale and at EPA's 1 Congress Street Office in Boston.

Why is a clean-up needed?
The Site is located on the eastern side of Plains Road in South

West Kingston/URI Superfund Site History

1951-1987: The West Kingston Town Dump operated and accepted waste from industrial, residential, commercial, and institutional sources. The disposal area was approximately 6 acres. Although the dump formally closed in 1978, some dumping continued until 1987.
1945-1987: The URI Disposal Area operated unregulated. Solid waste was disposed in an area covering approximately 6 acres.
1987: RIDOH began to investigate groundwater and surface water quality in the area of the Site.
1987: RIDEM investigated groundwater, surface water, and
1987: URI was required to remove 159 tons of material from the Site and dispose of it at a federally-approved waste disposal facility.
1988: Four private wells along Plains Road were connected to the URI water supply system after site contaminants were discovered in the well water.
1989: NUS Corporation, operating under an EPA contract, conducted a site investigation. Eleven rusted drums were observed lying on the ground in a former drum storage area east of the Town Dump and URI Disposal Area, and west of the access road. The drum contents included a brown, dried, caked material and a hardened tar-like substance. Two additional drums were found in 2004 and 2005 during a site investigations and disposed of at an offsite licensed facility.
1990: Final Listing Site Inspection Report completed by NUS Corporation, under contract to EPA.
1992: Site was listed on the National Priorities List (NPL).
2000: An additional private well along Plains Road was connected to the URI water supply system.
2001: RIDEM and EPA entered into an agreement as a mechanism to implement a Potentially Responsible Party (PRP)-lead remediation. In October 2001, the State issued a Letter of Responsibility with a Scope of Work to four potentially responsible parties to conduct a Remedial Investigation/Feasibility Study and implement measures to close the landfills.
2002 – 2005: Remedial Investigation was completed to evaluate the nature and extent of contamination and potential impacts from the landfill areas and Former Drum Storage Area.
2005 – 2006: Consistent with EPA's presumptive remedy guidance for municipal landfills, the landfill areas were consolidated and permanently closed under state law with RIDEM oversight. The following activities were completed in conjunction with closure:

- Final Design completed – March 2005
- Bidding and contract awarded – July 2005
- Construction began – August 2005
- Construction completed – June 2006

2006: Remedial Investigation Report and Feasibility Study Report were submitted to RIDEM and EPA.
2006: RIDEM, in coordination with EPA, prepared this proposed plan for public comment.

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Figure 1). The Site contains three discrete disposal areas: the West Kingston Town Dump and the URI Disposal Area, and the former drum storage area (see Site Plan in **Figure 2**.) The West Kingston Town Dump, which comprises the southern portion of the Site, is located to the east of Plains Road, approximately 0.4 miles north of the URI campus. Known in the past as "South Kingstown Landfill #2," the 6-acre West Kingston Town Dump received solid waste from the Town of South Kingstown beginning in the 1930s. In the early 1950s, the Town of Narragansett and URI also began disposing of their solid waste in the landfill. This disposal of solid waste went unregulated until 1967.

The URI Disposal Area, which comprises the northern portion of the Site, is also located to the east of Plains Road, 0.5 miles north of the URI campus. The URI Disposal Area consists of approximately 12 acres of a 17-acre sand and gravel excavation area. From 1945 to 1987, solid waste was accepted at the URI Disposal Area, referred to in the past as the "URI Gravel Bank" or the "Sherman Farm." After closure of the town dump in 1978, the URI Disposal Area began accepting most of URI's waste. RIDEM instructed URI to remove contaminated debris from the Site, an action that was completed by URI in 1987. In addition to the two main landfill areas, in 1989 a drum storage area was discovered on the URI site during site investigations. As described further below, subsequent investigations ultimately determined that this drum storage area (rather than the URI Landfill or Town Dump) was the primary source of groundwater contamination at the Site.

An estimated 15,800 people obtain their drinking water supply from three major public wells located within 4 miles of the Site. An additional 12,000 persons are supplied by private wells, the nearest being approximately 1,000 feet northwest of the Site. In 1988 site investigations revealed that three private wells along Plains Road were found to be impacted with site contaminants and were connected to the URI waster supply systems. An additional well also along Plains Road was connected to the water supply in 2000. In 2005, all adjacent wells were sampled for site-related contaminants. The results indicated that these wells had not been impacted by these site contaminants. The Site is located within the Chipuxet River valley basin. Hundred Acre Pond, part of the river, is approximately 1,500 feet from the Site. The river basin is a major groundwater resource.

Between 2002 and 2005, the Remedial Investigation was conducted to evaluate the nature and extent of residual contamination at the Site and assesses potential risks that the contamination may present to public health or the environment.

Based on the results of the Remedial Investigation, the following source areas were identified.

Landfill Areas (Town Dump and URI Disposal Area). The six former solid waste disposal areas that formed the Town Dump and URI Disposal Area were consolidated into three and have been capped with a RCRA impermeable cover system. These caps, which are part of a landfill closure that is separate from the remedial action proposed in this plan, have been constructed under RIDEM's administration and are consistent with EPA guidance prescribing the presumptive remedy for CERCLA municipal landfill sites. So long as these caps are properly maintained, they will eliminate direct exposure to waste material and will minimize future leaching from the closed landfills to the groundwater. Construction of the cover system was completed in June 2006. No further remedial action is required for the Landfill Areas other than institutional controls to restrict Site use and long-term monitoring and maintenance activities in accordance with the Operation & Maintenance (O&M) plan to ensure that the landfills remain protective of human health and the environment. These activities also contribute to the continued protectiveness of the proposed remedy in this plan.

Former Drum Storage Area. The Former Drum Storage Area was discovered on the URI site in 1989 and is located on the slope east of the Landfill Areas. Based on the results of the Remedial Investigation, this area is the source of volatile organic compounds (VOCs) to groundwater. This has resulted in a tetrachloroethene (PCE) and trichloroethene (TCE) groundwater plume that extends approximately 2,500 feet from the Former Drum Storage Area west

Figure 1 Site Location Map

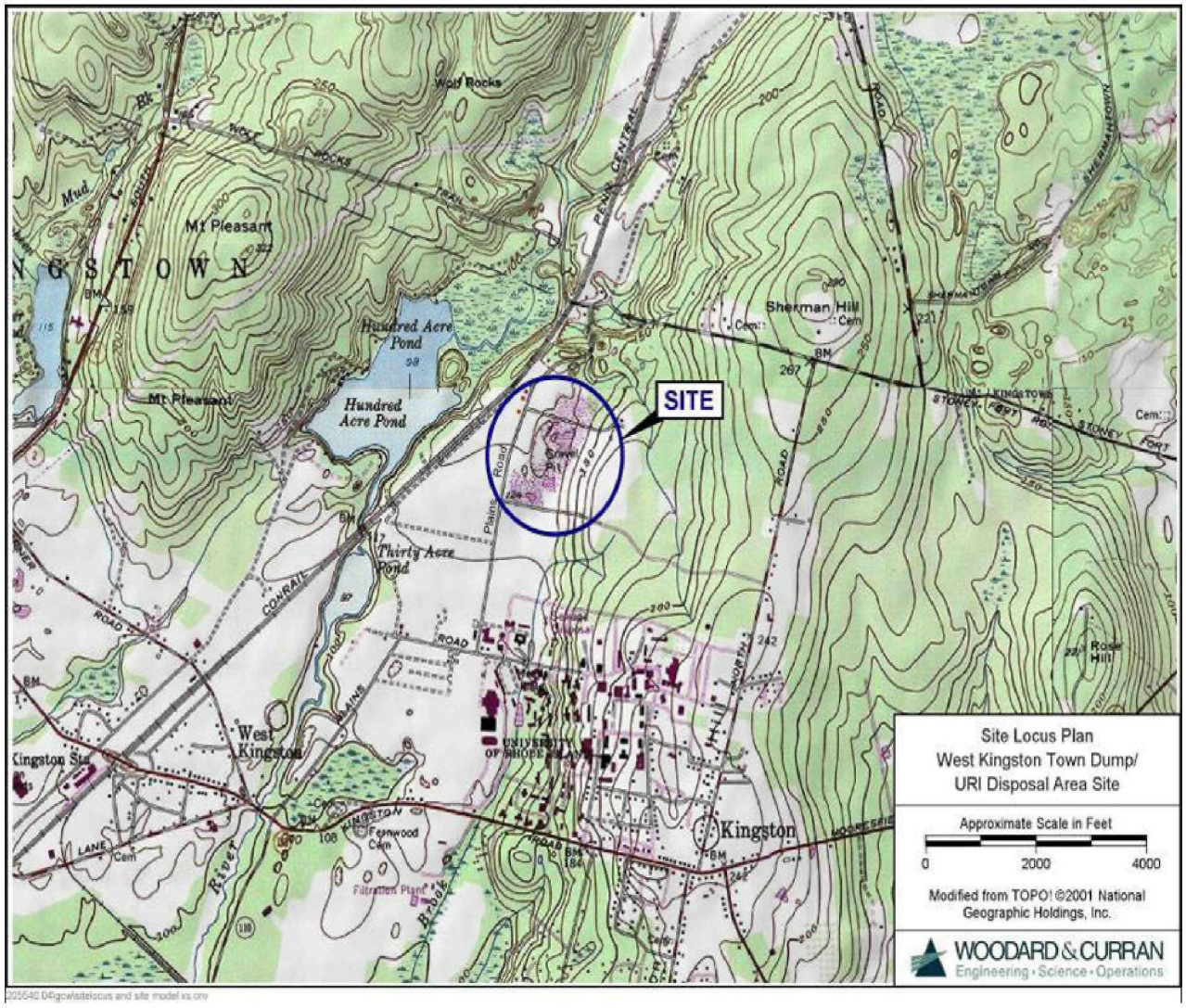
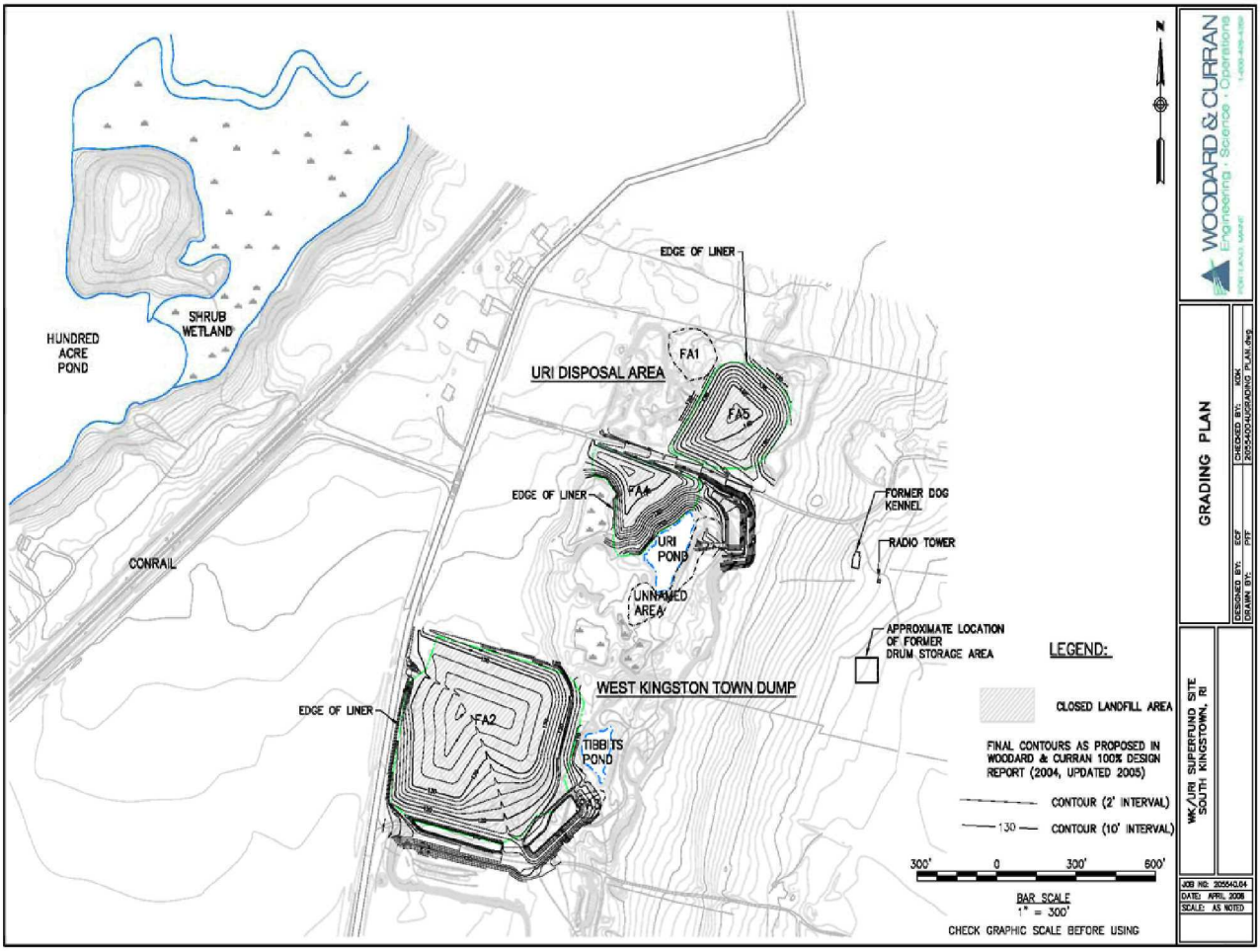


Figure 2 Site Grading Plan



toward Hundred Acre Pond. This proposed plan was developed to clean up the contamination from this area.

The contaminants at the Site include municipal -type solid waste, VOCs, semi- volatile organic compounds (SVOCs), and metals. Of these, the primary contaminants at the Site are limited to VOCs, are primarily PCE and TCE. These contaminants were reported in site soil, groundwater, and surface water, as well as in sediments in and adjacent to URI Pond. Site contaminants were also found in the pore water adjacent to Hundred Acre Pond. Investigations indicate that the source of these contaminants is the Former Drum Storage Area. The primary findings of the Remedial Investigation field activities are listed below:

- Soil in the Former Drum Storage Area has been impacted by VOCs, primarily PCE and TCE.

- Limited areas of surface soil adjacent to the closed landfills contained metals and SVOCs above screening criteria; however these compounds do not pose a risk to humans or biota.
- Groundwater in and downgradient of the Former Drum Storage Area has been impacted by PCE and TCE.
- Groundwater outside the plume, including an area with residential water supply wells surrounding Hundred Acre Pond, has not been impacted by site-related compounds.
- Surface water and sediment in URI Pond have been impacted by PCE and TCE.
- Neither PCE nor TCE were detected in the surface water or sediments in Hundred Acre Pond. PCE and TCE have been detected in the pore water adjacent to Hundred Acre Pond; however, these contaminants do not pose a risk to humans or biota.

The following provides an overall summary of potential risks evaluated in the human health risk assessment.

Potential Off-Site Risks

- There are currently four residences located above the PCE plume in the off-site area along Plains Road. These residences are currently connected to public water; therefore, the residents are not currently exposed to TCE or PCE in groundwater and, as a result, have no increased risk. Future off-site potable residential groundwater use in this area should remain prohibited, as future potential use would exceed EPA's risk limits [i.e., non-carcinogenic Hazard Quotient (HQ) greater than 1 or outside the 1×10^{-4} to 1×10^{-6} excess carcinogenic risk].

- Although the PCE and TCE were found in pore water adjacent to Hundred Acre Pond, pore water is inaccessible to humans and did not appear to be at levels that would pose a risk to area ecology; therefore it was determined that the PCE groundwater plume discharge does not adversely impact Hundred Acre Pond. As site-related VOCs were not detected in either surface water or sediments from Hundred Acre Pond, off-site conditions do not pose a significant health risk to potential users. Private wells for residences located near Hundred Acre Pond were also tested; only one such well contained any contaminant of concern, and this was at a concentration below EPA risk levels.

Potential On-Site Risks

- There are no current users of groundwater at the Site. However, because groundwater at

the Site is federally classified as a potential source of drinking water, risks calculated for the future reasonable maximum exposure (RME) use of Site groundwater indicated that concentrations of chlorinated solvents in groundwater pose an unacceptable risk to both potential future Site residents and potential future commercial/industrial workers.

- Currently, trespassers/recreational users may access portions of the Site, including upland soil and sediment and surface water from URI Pond and on-site wetlands. Risks evaluated for this potential exposure do not exceed EPA risk management criteria and, therefore, do not pose an unacceptable risk.
- Exposures to soil do not exceed EPA risk management criteria and, therefore, do not pose an unacceptable risk. (However some soils in the former drum storage area have concentrations of PCE that exceed RIDEM leachability criteria, indicating a continuing source of contamination to groundwater.
- Based on the results of this risk assessment, current on-site conditions do not pose a significant health risk to maintenance workers conducting tasks such as mowing, erosion control, road repair, and rip-rap replacement.
- Closure of the West Kingston and URI landfill Area at the Site eliminates the potential for exposure to waste material in these areas so long as these caps are maintained. As part of RIDEM's RCRA Subtitle C closure (separate from this proposed plan), the waste will remain under the cap at the Site, future use will be restricted as to not damage the cap or expose waste, and the cover system will be maintained in accordance with its O&M plan.

The following is an overall summary of the findings of the ecological risk assessment:

- Risks were evaluated for three study areas: the on-site Former Drum Storage Area, the on-site URI Pond, and off-site Hundred Acre Pond.
- This assessment concludes that little or no potential for adverse effects to ecological receptors exists at any of the three study areas.
- Data were either below benchmarks or reference data, or, where exceedances occurred, they were neither of sufficient number nor of a large enough magnitude to suggest significant potential risk.

A Closer Look at RIDEM's and EPA's Proposal

After careful study of the remaining contamination at the WK/URI Site, and giving detailed consideration in the Feasibility Study to five potential responses to contamination at the Site, RIDEM and EPA propose the following cleanup alternative to reduce risks associated with groundwater and soil contamination:

Alternative 4: Soil Excavation and Treatment, In Situ Source Area Groundwater Chemical Treatment, and Monitored Natural Attenuation. Alternative 4 protects human health by preventing or controlling potential exposures to contaminated soil and groundwater through chemical treatment of soil and groundwater in the source area and natural attenuation of contaminants in downgradient groundwater until this remedy returns the groundwater to safe drinking water levels. This alternative involves:

- Treatment of Source Area Soil. Contaminated soils below the surface at the former drum storage

area would be mechanically mixed in-place with a chemical oxidant (potassium permanganate). In sufficient concentration, potassium permanganate oxidizes PCE and TCE to benign products (carbon dioxide and chloride). This would include the following steps: excavate clean soil overlying the source area; stockpile clean soil; mix in place contaminated soil with solid potassium permanganate, and if necessary, water to optimize mixing; collect confirmation samples to document post-treatment soil conditions; backfill excavation and restore surface. The source area soil remediation would remove principle threat wastes on-site. Analytical results for the soil samples will be required to meet the state soil leachability criteria for areas with RIDEM GA/GAA Groundwater classification – suitable for drinking water use (0.1 milligrams per kilogram [mg/kg] for PCE).

- Treatment of Source Area Groundwater. In this alternative, sodium permanganate solution (another chemical oxidant) would be injected into the source area groundwater plume via injection wells. The injection system would consist of a row of bedrock wells and a chemical feed system.

  Prior to implementation of this alternative, detailed pilot studies would be performed to obtain additional characterization of subsurface conditions and to obtain parameters necessary to design and install an effective chemical oxidant injection system. As with the soil, the introduction of oxidants would be expected to convert PCE and TCE into carbon dioxide and chloride. This would substantially reduce contaminant concentrations in the short term, although it is expected that a long period of natural attenuation would still be necessary before the groundwater would meet drinking water standards.

- Monitored Natural Attenuation of Downgradient Groundwater. This remedy relies on natural processes to reduce the concentrations of dissolved chlorinated solvents in downgradient groundwater. Environmental monitoring would verify that mass reduction is occurring through natural degradation processes. This monitored natural attenuation would be the sole means (other than the institutional controls described below) of addressing the larger, more diffusely contaminated groundwater downgradient from the source area groundwater and the source area downgradient aquifers become cleaner, surface waters in the URI pond are also expected to meet performance standards (URI pond surface water will be monitored to ensure this occurs).

- Institutional controls in the form of deed restrictions to restrict groundwater and land use.

- Implementation of an environmental monitoring program. Environmental monitoring would involve routine periodic sampling and analysis of groundwater and surface water to confirm the effectiveness of the remedial alternative in reducing concentrations of site-related contaminants.

The entire remedy will be subject to a comprehensive statutory

review every five years. The purpose of the review is to evaluate the effectiveness of the remedy and to ensure that it remains protective of human health and the environment over time. Additional actions may be required if the review finds that the remedy is not protective.

The estimated cost of the preferred alternative is $2.3 million (cost projections are for 30 years).

Why Does RIDEM and EPA Recommend this Proposed Plan?

Based on current information, RIDEM and EPA believe the proposed cleanup plan achieves the best balance among the criteria used to evaluate alternatives. The proposed cleanup plan provides both short-term and long-term protection of human health and the environment and is cost-effective. More specifically:

- The proposed cleanup plan is expected to achieve soil cleanup levels at the conclusion of active treatment. This distinguishes the proposed plan from more passive alternatives such as exclusive reliance on monitored natural attenuation.
- The proposed cleanup plan is expected to quickly and significantly reduce the toxicity and volume of contaminants in the most contaminated groundwater during the relatively short period of active treatment, although a longer period would be required to achieve cleanup levels throughout the plume.
- The proposed cleanup plan is expected to result in no impacts on wetlands and to have minimal construction impacts. This is an advantage over the full pump-and-treat alternative (Alternative 5, below), which relies on pumping and treating all contaminated groundwater and shipping contaminated soils offsite, and which would require building extraction wells in wetland areas.
- The proposed cleanup plan is expected to avoid the inherent uncertainty associated with disposal/containment of untreated soil. This is an advantage over alternatives that rely on shipping contaminated soils offsite (i.e., Alternative 5 below), potentially without treatment.
- The proposed cleanup plan is expected to be less expensive than the other two active treatment alternatives subjected to detailed analysis, and is significantly less expensive than an alternative relying on offsite removal of contaminated soils and pumping and treating all contaminated groundwater (Alternative 5).

During the comment period, RIDEM welcomes your comments on the proposed cleanup plan as well as the other technical approaches that RIDEM and EPA evaluated. These alternatives are summarized on the next page. For additional information, please consult the Feasibility Study, available at the South Kingstown Public Library in Peace Dale and at EPA's Records Center in Boston.

Cleanup Levels

RIDEM (as lead agency) and EPA (as supporting agency) have established site-specific cleanup levels for groundwater, soils, and surface water. These cleanup levels are protective of human health and the environment based upon the exposure scenarios evaluated in the Remedial Investigation. The cleanup levels are described in Section 3 and Tables 3-4 through 3-6 of the Feasibility Study. The cleanup levels are to reduce PCE and TCE concentrations in the groundwater plume to 5 parts per billion, to reduce PCE concentrations in surface water at URI Pond to 8 parts per billion, and to reduce PCE concentrations in subsurface source area soil to 0.1 mg/kg.

Potential Impacts to the Community

RIDEM's preferred alternative is not expected to have significant impacts on the local community. Monitoring activities, and operation of injection system are not expected to affect the community.

Four Kinds of Cleanup

RIDEM looked at four basic technical approaches to develop several potential remedies to the contamination at the WK/URI Site, including the preferred alternative described above. These four approaches were:

1) Take no action: Leave the site as it is.

2) Monitored Natural Attenuation: Leave contamination in place, use institutional controls to prevent exposure to, or spread of, contaminants, and monitor site conditions. This method reduces risks from exposure to contamination, and would naturally reduce the concentration and mass of contaminants over time.

3) Move contamination off site: Remove contaminated material and dispose of it or treat it elsewhere.

4) Treat contamination on site: Use a chemical of physical process on the site to destroy or remove the contaminants. Treated material can be left or discharged on-site; residuals can be disposed of in an off-site facility.

RIDEM's proposed cleanup plan for the WK/URI Site incorporates two of the four options noted above to reduce risks and protect human health and the environment: treatment on-site and monitored natural attenuation. Specifically, the proposed plan will:

- Reduce mass and toxicity of contaminants in soil by treating soil on site.
- Reduce mass and toxicity of contaminants in source area groundwater by treating groundwater on site.
- Allow naturally occurring processes to continue to reduce contaminant concentrations in groundwater downgradient of the source.
- By treating groundwater, reduce discharges of contaminants into the surface waters.
- Monitor Site conditions to assess expected reductions in site contaminants over time.
- Establish and maintain institutional controls to restrict groundwater, pond, and land use.

Other Cleanup Activities Considered for the West Kingston / URI Superfund Site

A Feasibility Study reviews the alternatives that the lead agency (in this case, RIDEM) in coordination with the support agency (here, EPA) considers for cleanup at a Superfund site. The options, referred to as "cleanup alternatives," are different combinations of plans to restrict access to, contain, move, or treat contamination to protect public health and the environment.

RIDEM, in coordination with EPA, evaluated the alternatives described below to address contaminated groundwater and residual soil contamination associated with the Former Drum Storage Area.

During the comment period, RIDEM welcomes comments on the proposed cleanup plan as well as the other alternatives. Site-wide alternatives were developed to treat the following media: contaminated source area soil, contaminated groundwater in the source area (source groundwater), contaminated groundwater downgradient of the source area (downgradient groundwater), and impacted surface water in the on-site URI pond. The surface water will be treated through whatever groundwater remedy is selected (i.e., as the groundwater is cleaned up, URI surface waters will be monitored to ensure that cleaner surface water results) and

does not have a separate remedy.

Site Cleanup Alternatives

Alternative 1: No Action
Under this alternative, nothing would be done to address the contamination that exists in the groundwater and soil, except to reassess the situation at least every five years. One round of environmental sampling for site-related contaminants would also be conducted every five years. The no action alternative is included to provide a baseline for comparison with other alternatives.
Estimated Cost: $227,000

Alternative 2: Monitored Natural Attenuation and Institutional Controls
Under this alternative, institutional controls in the form of deed restrictions would be put in place to limit potential future use of contaminated groundwater and soil until groundwater cleanup levels are reached. Natural degradation processes would continue to reduce contaminant levels. Environmental monitoring of groundwater and surface water would be conducted to assess the effectiveness of the natural processes until cleanup levels are achieved.
Estimated Cost: $1 million.

Alternative 3: Soil Excavation and Treatment, In Situ Source Groundwater Treatment (via permeable reactive barrier), and Monitored Natural Attenuation
Under this alternative, contaminated source area soil would be treated on site with chemical oxidants (mixed directly into the contaminated soil after excavation of the clean layer of soil lying above the contaminated soils) to reduce the concentration and toxicity of contaminants in the soil. For source groundwater, a "permeable reactive barrier" PRB would be installed to achieve more rapid reductions in contaminant concentrations. A PRB is an innovative technology in which a barrier containing granular carbon is put into the ground to intercept the plume of contaminated groundwater as it flows downhill. The granular carbon destroys PCE and TCE as the plume flows through the barrier. Natural degradation processes would be relied on to reduce contaminant levels in water downgradient of the barrier, and also to work in tandem with the barrier to help clean up source area groundwater. This alternative would require treatability studies in order to select and design the appropriate system. Institutional controls would also be required to limit future use of contaminated groundwater until groundwater cleanup levels were reached. Environmental monitoring of groundwater and surface water would be conducted to assess the effectiveness of the natural and in-situ processes until cleanup levels are achieved.
Estimated Cost: $3.1 million

Alternative 4: Soil Excavation and Treatment, In Situ Source Groundwater Chemical Treatment, and Monitored Natural Attenuation
This is the preferred alternative. Under this alternative, as in Alternative 3, contaminated soil would be treated on site with chemical oxidants. Natural degradation processes would be relied on to reduce downgradient groundwater contaminant levels, again as in Alternative 3. But Alternative 4 differs from Alternative 3 in that source area groundwater would be treated in situ by injecting a chemical oxidant, as opposed to the PRB previously described. This is expected to significantly reduce source area mass within a relatively short time, although monitored natural attenuation within source area groundwater would still be required to go the rest of the way towards achieving groundwater remediation goals. An on-site chemical feed system would be constructed. Additional studies would be required to design the groundwater extraction and treatment system. Institutional controls would also be required to limit future use of contaminated groundwater until groundwater cleanup levels were reached. Environmental monitoring of groundwater and surface water would be conducted to evaluate the effectiveness of the treatments and natural attenuation processes until cleanup levels are achieved.
Estimated Cost: $2.3 million

Alternative 5: Soil Excavation

and Off-Site Disposal with Groundwater Extraction

Under this alternative, contaminated source area soil would be excavated and disposed of off-site at a licensed disposal facility, or stockpiled on site and used to backfill the excavation (depending on the analytical results). For source and downgradient groundwater, extraction wells would be used to capture contaminated groundwater. An on-site groundwater treatment facility would be constructed to treat extracted groundwater, for example by filtering the extracted groundwater through granular activated carbon to remove the PCE and TCE. The treated groundwater would be discharged into reinjection wells or surface water. Additional studies would be required to design the groundwater extraction and treatment system. Institutional controls would also be required to limit future use of contaminated groundwater until groundwater cleanup levels were reached. Environmental monitoring of groundwater and surface water would be conducted to evaluate the effectiveness of the treatment until cleanup levels are achieved. Estimated Cost: $10 million

Evaluation of Alternatives

These nine criteria are used to balance the advantages and disadvantages of various cleanup alternatives as listed in the following table on page 13. RIDEM and EPA have evaluated how well each of the cleanup alternatives meets the first seven criteria. Once comments from the state and the community are received
EPA will evaluate all nine criteria and select the final cleanup plan.

Overall Protection of Human Health and the Environment:

Although there are no current unacceptable human health or ecological risks associated with the Site, based on existing exposure pathways (i.e., no one is currently drinking the groundwater), risk levels are exceeded for future on- and off-site residents and future workers from use of groundwater as potable water. Alternative 1 will not provide any additional protection to human health or the environment. Future risks from exposure to groundwater would remain and leaching of contaminants from subsurface soil to groundwater would not be reduced. Under this alternative, there would be no restrictions on groundwater use.

Alternatives 2, 3, 4, and 5 all will achieve cleanup objectives and will be protective of human health and the environment in the long term, except that under Alternative 2 leaching of contaminants from soil to groundwater would not be reduced. Each of alternatives 2 through 5 would require institutional controls to prevent the use of contaminated groundwater for drinking water during the long period before cleanup objectives arte achieved. Alternative 2 may require the most time to achieve groundwater cleanup levels as it relies solely on natural processes. Alternatives 3, 4, and 5 would require approximately 1-2 years of treatability studies, engineering design effort, and construction before the alternatives would be fully implemented, at which point it is expected that significant reductions in contaminant mass would be begin to be achieved (unlike Alternatives 1 and 2). Despite the initial mass reduction associated with Alternatives 3-5, Alternative 5 and especially Alternatives 3 and 4 would require a significant period of time to achieve the ultimate cleanup objectives (as described further below).

Compliance with Applicable or Relevant and Appropriate Environmental Requirements (ARARs)

Although Alternatives 1 through 4 are not expected to meet all chemical-specific ARARs in the short term, each is expected to attain their respective Federal and State ARARs over time, with the following exceptions: under Alternative 1, No Action, and Alternative 2, MNA, contaminants in soil would not undergo treatment and would, therefore, continue to exceed the

RIDEM leachability criteria ARAR. Alternatives 1 and 2 would take the longest to meet groundwater cleanup requirements because they rely solely on natural processes (approximately 110 to 460 years). Alternatives 3 and 4 provide treatment of both source area soil and groundwater, and are expected to achieve groundwater ARAR's in somewhat less time (approximately 25 to 50 years). Under Alternative 3-5, soil ARAR's would be expected to be achieved relatively quickly – immediately upon completion of the active phase of treatment, i.e., either chemical oxidation or excavation and shipment to an off-site facility. Under all Alternatives, achievement of ARAR's in surface waters of the URI Pond is expected to occur as ARAR's are achieved in the surrounding aquifer.

Long-Term Effectiveness and Permanence

Alternative 1 would provide the least long-term effectiveness because no actions would be taken to reduce contaminant mass in either soil or groundwater or to restrict the future use of the untreated groundwater plume. Alternative 2 would be more effective than Alternative 1 in the long term would be implemented to limit future groundwater use during the long period of the natural degradation of contaminants. The remaining three alternatives (Alternatives 3, 4, and 5) each

The Nine Criteria for Choosing a Cleanup

By law, nine criteria are used to evaluate the cleanup alternatives and select a remedy. Of the nine, protection of human health and the environment and compliance with Applicable or Relevant and Appropriate Requirements (ARARs) are considered threshold requirements that must be met by the selected remedy (except that under certain limited circumstances a particular ARAR may be waived). RIDEM in coordination with EPA must balance its consideration of alternatives with respect to long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. State and community concerns are modifying criteria and may prompt modification of the preferred alternative or selection of another alternative. Following are definitions of the nine criteria.

1. Overall protection of human health and the environment: Will it protect people and the plant and animal life on and near the site? A plan will not chosen if it does not meet this basic criterion.

2. Compliance with ARARs: Does the alternative meet all federal and state environmental statutes, regulations and requirements? A plan will not be chosen if it does not meet this basic criterion, except in limited situations where the legal criteria for waiving an ARAR have been met.

3. Long-term effectiveness and permanence: How reliable will the alternative be at the long-term protection of human health and the environment? Is the contamination likely to present a potential risk again?

4. Reduction of toxicity, mobility or volume through treatment: Does the alternative reduce the harmful effects of the contaminants, the spread of contaminants, and the amount of contaminated material through treatment?

5. Short-term effectiveness: How soon will site risks be adequately reduced? Could the cleanup cause short-term hazards to workers, residents or the environment?

6. Implementability: Is the alternative technically and administratively feasible? Are the right goods and services (i.e. treatment machinery, space at an approved disposal facility) available for the plan?

7. Cost: What is the total cost of an alternative over time?

8. State acceptance: Does RIDEM agree with the proposed plan? (Since RIDEM is the lead agency publishing this proposed plan, state acceptance is not expected to be an issue.)

9. Community acceptance: What objections, suggestions or modifications does the public offer during the comment period?

Table 1

■ Meets or Exceeds Criteria

□ Does not Meet Criteria

Nine Criteria	Alternative 1 No Action	Alternative 2 MNA	Alternative 3 Excavation/ Treatment with PRB/MNA	Alternative 4 * Excavation/ Treatment with In Situ Chem Ox/ MNA	Alternative 5 Excavation/Off-Site Disposal with Groundwater Capture
Protection of Human Health and the Environment	□	■	■	■	■
Meets Federal & State Requirements	■	■	■	■	■
Provides Long Term Protection	□	■	■	■	■
Reduces Toxicity, Mobility & Volume Through Treatment	□	□	■	■	■
Provides Short Term Protection	□	■	■	■	■
Implementable	□	■	■	■	■
NPV Cost over 30 year Period	$149,000	$1M	$3.1M	$2.3M	$10M
State Acceptance	To Be Determined After Public Comment Period				
Community Acceptance	To Be Determined After Public Comment Period				

prevent future potential risks via institutional controls and various degrees of active treatment. However, Alternative 5 is unique in that it relies on moving contaminated soils to offsite storage facilities potentially without treatment to reduce the rest of contaminants, thereby implicating the inherent uncertainty associated with long-term land disposal of contaminated media.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 1 and 2 would not reduce contaminant toxicity, mobility, or volume through treatment, as no active treatment would be implemented. Alternatives 3 and 4 rely on treatment technologies to reduce contaminant toxicity, mobility and volume. These alternatives would be expected to provide reductions in the toxicity and mass of contaminants in both soil and groundwater using treatment via the PRB or chemical oxidation processes in the long term. One exception to this is that the contaminated groundwater downhill from the former drum storage area (where contamination is more diffuse) would not be subjected to treatment apart from monitored natural attenuation; reductions in toxicity, mobility, and volume would be limited to source area groundwater.

Under Alternative 5, excavation and off-site disposal of contaminated soil in an off-site landfill would greatly reduce contaminant mobility, but would not provide a permanent reduction in contaminant toxicity or volume, unless the off-site facility decided to treat the contaminated soils before of disposing of it. Treatment of contaminated groundwater under Alternative 5 would reduce contaminant mobility, toxicity, and volume.

Short –Term Effectiveness

Alternative 1 does not provide any short-term risks to the community in the form of construction impacts but it would not do anything to clean up contamination at the Site or to prevent exposures to contaminated groundwater over the long period before contaminants naturally attenuate in the aquifer. Alternative 2 also has no construction impacts, but has more short-term effectiveness because institutional controls would prevent use of the groundwater as drinking water during the attenuation period.

Alternatives 3, 4, and 5 are expected to mitigate potential groundwater risks in the short term not only by implementing institutional controls, but also by reducing the mass of contaminants in the groundwater over a relatively short period of active treatment (although the estimated time to achieve groundwater remedial objectives is still lengthy for Alternatives 3 and 4). Alternatives 3, 4, and 5 would also eliminate contaminants in source area soil relatively quickly, i.e., upon completion of the active treatment phase.

The short-term impacts to the local community and to on-site remedial workers under Alternatives 3 and 4 are expected to be minimal and controllable, as all activities would be conducted within the Site property boundaries. The short-term impacts to the environment under Alternatives 3 and 4 are also expected to be minimal due to the small volume of soil requiring removal and short duration of construction activity. Although no construction or remedial activity is proposed in wetland areas under either alternative, the potential exists under Alternative 4 that chemical Oxidants injected into groundwater could migrate to and potentially impact the URI Pond. Although no effects are anticipated, wetland areas would be monitored to evaluate potential impact.

Under Alternative 5, short-term construction impacts would be anticipated to be the greatest due to the need to install a portion of the extraction/reinjection system outside the property boundary and in the vicinity of wetland areas adjacent to Hundred Acre Pond, resulting in an increase in local truck traffic and impact to several property owners.

All remedial activities would be conducted to minimize impacts on wetlands, in accordance with pertinent ARARs.

Implementability

Alternative 1 is the easiest to implement because no remedial actions are required. Alternative 2 is easily implementable as it allows natural attenuation processes to address groundwater contamination. Institutional controls to prevent the use of contaminated groundwater for drinking water and implementation of a long-term monitoring program are also easily implementable.

Alternatives 3, 4, and 5 are implementable, but more complex as they require the completion of treatability studies, engineering design efforts, and construction before the various treatment systems can be operated. But these active treatment alternatives are not expected to present any extraordinary engineering or administrative problems, and all materials and services should be obtainable. All of these alternatives would also involve the implementation of institutional controls and long-term monitoring programs which are also easily implementable.

Cost

Alternative 1 has no capital costs and the cost associated with the required environmental monitoring and five-year reviews is low. The cost for alternative 1 is $227,000.

Alternative 2 has no capital costs but would have costs associated with implementing institutional controls and a long-term monitoring program. The cost for Alternative 2 is $1 million.

The treatment alternatives (Alternatives 3 through 5) all have capital as well as operating costs. Alternative 3 would cost $3.1 million; Alternative 4 would cost $2.3 million; Alternative 5 would cost $10 million.

State Acceptance

RIDEM was the lead oversight Agency and collaborated closely with EPA in overseeing the PRP –lead Remedial Investigation and Feasibility Study. RIDEM is also the lead Agency on the proposed cleanup plan and will address any additional comments in the final cleanup decision document. EPA has approved the issuance of this proposed plan. EPA, with RIDEM coordination, will prepare and issue the final cleanup decision document.

Community Acceptance

Community acceptance will be based on comments received. During the 30-day formal comment period, RIDEM will accept written comments and hold a formal public hearing to accept formal verbal comments.

What is a Formal Comment?

To make a formal comment you need only speak during the public hearing on **Wednesday July 26, 2006** or submit a written comment during the comment period, which runs from June 29 through July 31, 2006.

Regulations require the RIDEM and EPA to distinguish between "formal" and "informal" comments. Our procedures require that responses by RIDEM and EPA to formal comments take the form of a written response (rather than an oral response). This means that, at the formal hearing on **July 26, 2006,** RIDEM and EPA will not respond orally to any formal comments.

The fact that the RIDEM and EPA can respond to formal comments only by a means of writing response does not mean that the RIDEM and EPA cannot answer questions. Once the meeting moderator announces that the formal hearing portion of the meeting is closed, RIDEM and EPA can respond orally to informal questions.

The RIDEM and EPA will review the transcript of all formal comments received at the hearing, and all written comments received during the formal comment period, before making a final cleanup decision. The RIDEM and EPA will then prepare a written response to all the formal written and oral comments received.

Your formal comment will become part of the official public record. The transcript of comments and the RIDEM's and EPA's written responses will be issued in a document called a Responsiveness Summary when EPA releases the final cleanup decision.

Next Steps

This fall, the State and EPA expect to have reviewed all comments and EPA expects to sign a Record of Decision (ROD) document describing the chosen cleanup plan. The ROD and a summary of responses to public comments will then be made available to the public at the site information repositories listed here, as well as on EPA's WK/URI Superfund Site web site noted on this page.

For More Information

Site Contacts

If you have any questions about the site or would like more information, you may call or write to:

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Information Repositories

This publication summarizes a number of reports and studies. All of the technical reports and studies prepared to date for the site are available at the following information repositories:

South Kingstown Public Library
1057 Kingstown Road
Peace Dale, RI 02879
401-783-4085

EPA Records Center
1 Congress Street
Boston, MA
Please call to schedule an appointment
(617) 918-1440

Information is also available for review on the world wide web:
http://yosemite.epa.gov/r1/npl_pad.nsf/701b6886f189ceae85256bd20014e93d/4964cee52b24605c8525691f0063f703!OpenDocument
All documents may be downloaded and printed. Adobe Acrobat Reader is required.

Send us Your Comments

You may provide the RIDEM and EPA with your written comments about the Proposed Plan for the WK/URI Site. You can email to the address below or send written comments by mail postmarked no later than July 31, 2006 to:

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